DOCUMENT RESUME

ED 140 476 EA 009 645

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TITLE Alternative Measures of Local Wealth and Effort.
INSTITUTION Illinois State Office of Education, Springfield. Dept. of Planning and Research.
PUB DATE 77
NOTE 45p.
AVAILABLE FROM Center for the Study of Educational Finance, Department of Educational Administration, Illinois State University, 331 DeGarmo Hall, Normal, Illinois 61761 ($2.00)

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Assessed Valuation; *Educational Finance; Elementary Secondary Education; *Equalization Aid; Expenditure Per Student; *Finance Reform; *Models; *State Aid; State School District Relationship; *Statistical Analysis; Tables (Data); Tax Rates
IDENTIFIERS *Illinois

ABSTRACT

Under Illinois revenue equalizer school finance formula, school districts with the same operating tax rate are guaranteed the same operating expenditure level. However, with other factors held constant, it is harder for relatively low-income districts to pass referenda to raise their operating tax rates in order to gain a higher operating expenditure level under the revenue equalizer formula. This publication contains two articles that discuss two alternative school finance mechanisms that are intended to provide equal access to available resources for relatively low-income districts. Chapter 1, which was written by J. Dan Hou, covers a study investigating the effects of four income weightings applied to assessed valuation on the distribution of Illinois state aid to education. Chapter 2 covers a study conducted jointly by J. Dan Hou and Warren B. Carson, which was designed to compare the effects of three separate income weightings applied to operating tax rates on the distribution of Illinois state aid to education. (Author/JG)

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ALTERNATIVE MEASURES OF LOCAL WEALTH AND EFFORT

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Spring - 1977

EA 009 645

FOREWORD

Illinois public school districts can choose either the Strayer-Haig formula or the resource equalizer formula to compute their state aid claims. The number of Illinois school districts using the resource equalizer formula is increasing each year. As of 1975-76, eighty-one percent of Illinois school districts with ninety-four percent of pupils picked the resource equalizer formula.

Under the resource equalizer formula, school districts with the same operating tax rate are guaranteed the same operating expenditure level. It is known that lower operating tax rates tend to be associated with school districts with lower median family or per capita income, and vice versa, especially in elementary and high school districts. Hence, a lower operating expenditure level tends to be found in school districts with a lower income level, and a higher operating expenditure level in school districts with a higher income level. In other words, the inclusion of the operating tax rate in the resource equalizer formula may be helping income rich school districts more than income poor districts in terms of operating expenditures.

With other factors held constant, it is harder for income poor districts to pass referenda in order to raise their operating tax rates for a higher operating expenditure level under the resource equalizer formula. To provide equal access to available resources for school districts with less ability to pay, i.e., lower income level, two mechanisms have been proposed in some states and used in others to include an income factor in the various state aid systems. The first proposal involves weighing assessed valuation by income. This method is being used by Rhode Island, Kansas and some other states. The second mechanism, which was proposed to the Illinois General Assembly in 1975, is to weigh tax rate by income.

Chapter I in this publication was written by J. Dan Hou, Research and Statistics Section. This chapter covers a study investigating the effects of four income weightings applied to assessed valuation on the distribution of Illinois state aid to education. The second chapter covers a study conducted jointly by J. Dan Hou, and Warren B. Carson, Department of Administrative Operations, which was designed to compare the effects of three separate income weightings applied to operating tax rates on the distribution of Illinois state aid to education. These two studies will contribute some valuable ideas on how to move school districts toward equal access to available resources. However, matters of fact or opinion contained herein are solely the responsibility of the authors and in no way reflect the official policy of the Illinois Office of Education, State Board of Education.

Joseph M. Cronin
State Superintendent of Education

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J. Dan Hou and Warren B. Carson

EFFECTS OF VARIOUS INCOME WEIGHTINGS ON THE DISTRIBUTION OF ILLINOIS STATE AID TO EDUCATION

Introduction

The "resource equalizer", which is nationally known as district power equalization (DPE), was adopted as one of the two state aid formulas in the 1973 reform of the Illinois state aid system. Every district can choose either the Strayer-Haig formula or the "resource equalizer" formula to compute its state aid claims. As of 1975-76, 81 percent of Illinois districts with 94 percent of pupils picked the "resource equalizer" formula. It is very obvious that the "resource equalizer" formula is the major feature of the Illinois state aid system.

According to the "resource equalizer" formula, the expenditure level of a district is the function of the district operating tax rates. Districts with higher operating tax rates will have higher expenditures per pupil. These districts are always the districts with lower assessed valuation per pupil. Therefore, the "resource equalizer" formula can benefit the (property) poor districts. However, research literature indicated that poor families do not always live in the (property) poor districts.[1] Therefore, poor families who do not live in school districts with lower assessed valuation per pupil may not be favored by the "resource equalizer" formula.

Serrano and other similar suits focused on variation in revenues or expenditures per pupil caused by variation in assessed valuation to the

exclusion of other variables. To channel more revenues to school districts with more pupils from poor families, one of the most often considered proposals was to include the district personal income in the state aid system.[2]

One of the ways proposed to include personal income in the state aid formula is to combine assessed valuation with personal income as the measure of district wealth. The idea of the combined measure of wealth has been considered very seriously for the last two decades.

In 1964 Ahlf found that the present use of the single resource of equalized valuation of property provided an unsatisfactory measure of the fiscal capacity of school districts. His findings also revealed that the fiscal capacity of school districts could be determined more accurately by using a combination of the three weighted resources, i.e., equalized valuation of property, reported family income, and effective buying income, than by using any of these single resources.[3]

In 1969, James and Cronin made a strong comment on this combined measure of wealth:

> Neither measures of property value nor measures of income constitute the sole valid estimate of community taxpaying ability in all communities. Present reliance on one or the other of the two lead to unintentional inequities in both taxation and distribution schemes. Future researchers doubtless will continue to identify the differences of the two measures, and the possibility of developing an equitable mixture of the two or of finding other valid measures of wealth.[4]

Through the efforts of Benson and Kelly, the combination of assessed valuation and personal income was put into practice in Rhode Island in 1968. In the Rhode Island state aid formula, equalized assessed valuation is adjusted by an income index, which is the ratio of the school district median family income to the state median family income. Benson and Kelly reasoned as follows:

> . . . that income and property are both measures of wealth, that places high in property values are sometimes low in income, and vice versa, and that other industrial cities frequently are in precisely that situation--low in income but high in property values. Because the two measures represent different dimensions of taxpaying ability, the state should take each into account in determining local wealth for state aid purposes.[5]

In 1972, Crosby applied the Rhode Island income index to the New Jersey state aid system. He found that the Rhode Island income index can improve the relationship between the district taxpaying ability and the school tax burden. In other words, low-income districts will exert mildly lower school tax rates and high-income districts will exert mildly higher school tax rates under the income-adjusted assessed valuation than they will under the assessed valuation without any income adjustment.[6]

In evaluating the 1973 reform of the Illinois state aid system, Hickrod and his associates found that income per ADA of school districts in the central and southern rural areas is relatively lower than that in the northern rural areas.[7] Assessed valuation per pupil has been found relatively high in the rural areas. Therefore, they contended that the inclusion of an income factor in the wealth measure would be helpful to the central and the southern rural parts of the state.

In 1975, Hou conducted a study to determine the effects of the combination of district assessed valuation and median family income on the distribution of state aid. The combination was the same as the one being used in Rhode Island. He found that income-weighted assessed valuation has more equity effects than traditional assessed valuation. He then recommended that district median family income be considered as one of the income factors to be introduced into the Illinois state aid system.[8]

The measures of income which have been used most often in school finance research are per capita income, median family income, and per pupil income.

These measures reflect different relative ability-to-pay of any particular geographic area. For instance, among the 438 Illinois unit (K-12) districts, the City of Chicago ranked 4th in per ADA income, 47th in per capita income, and 92nd in median family income.[9] Thus the use of different income measures as weighting factors on district assessed valuation is likely to result in widely different distributions of state aid to local school districts. Therefore, when consideration is given to introducing income factors into a state aid formula, it is important to investigate the possible different effects of different income weightings.

In this study four income weightings were applied separately to assessed valuation to derive four measures of income-weighted wealth: per capita income weighting, median family income weighting, aggregate income weighting and per TWADA income weighting. The Per Capita Income Weighting is the ratio of the district per capita income to the State per capita income. The Median Family Income Weighting was derived by dividing the district median family income by the State median family income. The third weighting is the Aggregate Income Weighting which is the average of district assessed valuation and district aggregate income. The Per TWADA Income Weighting is the ratio of the district per TWADA income to the State per TWADA income.

It was the purpose of this study to investigate the effects of the aforementioned four income weightings on the distribution of Illinois state aid to education.

Statement of the Problems

The objectives of the study was to investigate the following questions:

1. Which of the four income weightings has the greatest influence on the distribution of state aid to the following five types of communities: central city, independent city, high growth suburb, low growth suburb, and rural area?

2. Which of the four income weightings has the greatest influence on reducing variability of district expenditures per pupil?
3. Which of the four income weightings has the greatest influence on fiscal neutrality?

Sources of Data

The fiscal data used in this study were collected from the Illinois Office of Education publication, Annual State Aid Claim Statistics, 1975-76, Circular Series A, Number 348: 1973 assessed valuation, 1973 operating tax rate, 1974-75 ADA, and 1974-75 Title I eligibles. Income data, such as per capita income, median family income and aggregate income of every district were obtained from the 1970 Census: Illinois School District Profiles which was also published by the Illinois Office of Education. The information in the Profiles was retrieved from the fourth count tape of the 1970 Census data developed by the U. S. Bureau of the Census. Data to categorize independent cities were collected from the 1970 Census of Population, PC(1)-C15, Illinois, published by the U. S. Bureau of the Census.

Variables Used and Definitions of Terms

Community Type. The geographic typology of school districts adopted in this study was a modification of the system used by school finance researchers at the University of Wisconsin.[10] Every school district was categorized according to the geographic typology. "Central city" districts are those school districts serving the largest city in each of the nine standard metropolitan statistical areas (SMSA) of Illinois as defined by the 1970 Census. "Independent city" districts are those school districts serving a city with a population of 10,000 or more in 1970 but not located within any of the nine SMSA's. Two other types of school districts were classified as "suburban". To qualify as a "suburban"

district, a school district must be located within an SMSA but outside the central city therein. The enrollment growth of these suburban districts was then calculated between 1964-65 and 1973-74 If the suburban school districts were above the median in percentage increase of students, they were designated as "high growth suburb" districts, and if below the median, they were categorized as "low growth suburb" districts. Finally, all school districts which were neither in an SMSA nor in "independent cities" were designated "rural."

Fiscal Neutrality. The principle of fiscal neutrality was established in the Serrano case. It is simply a state of affairs in which district educational spending should not be a function of local wealth. The operational definition of fiscal neutrality will be illustrated later in this paper.

Income. District income data were retrieved from the fourth count tape of the 1970 Census data. In the 1970 Census, income was defined as the sum of wage or salary income, nonfarm net self-employment income, farm net self-employment income, Social Security or railroad retirement income, public assistance or welfare income and all other income.[11]

Revenues. In this study, revenues refer to the sum of the local revenues and the district state aid entitlements. Local revenues are the product of the district 1973 assessed valuation multiplied by the 1973 operating tax rates. The operating tax rates as defined in The School Code of Illinois consist of all district taxes extended for all purposes except Bond and Interest, Summer School, Rent, Transportation, Special Education Building, Capital Improvement, and Vocational Education Building.[12]

TWADA. This is an acronym for Title I Weighted Average Daily Attendance. In this study TWADA is the sum of 1974-75 WADA and the weighted Title I eligibles. The Strayer-Haig formula provides for a constant 0.45 weighting for every ESEA Title I pupil, and the "resource equalizer" formula provides for a Title I

pupil weighting on the basis of the percentage of district Title I eligibles compared to the state percentage. The maximum Title I weighting the "resource equalizer" formula can provide for every Title I eligible is 0.75.

Research Design and Procedures

Study Population

The population of this study consists of all public school districts in Illinois, except those consolidated since July 1, 1974. The exception is due to the fact that 1970 Census data are not in a format to reflect these consolidations. This makes 1,036 public school districts the population of this study: 461 elementary, 131 high school, and 444 unit districts.

In developing geographic typology, 1964-65 and 1973-74 enrollment figures were used to classify districts into high or low growth suburban school districts. During these ten years, there were consolidations of school district. To be comparable, these consolidated districts in the suburbs within these ten years were excluded. As a result, only 930 school districts remained for investigating the effects of the studied income weightings by community types.

Procedures

In this study four simulations of the estimated 1975-76 state aid formulas were performed. In the simulations, all except one variables in computing estimated 1975-76 state aid were held constant. The only exception is 1973 assessed valuation. In each of the four simulations, the 1973 assessed valuation was weighted by one of the four studied income factors. Per capita income weighting was applied to the 1973 assessed valuation in the first simulation, median family income weighting in the second simulation, aggregate income weighting in the third simulation, and per TWADA income weighting in the fourth

simulation. As a result, four figures of additional estimated 1975-76 state aid were derived to reflect the effects of the four studied income weightings. In investigating the effects of the four income weightings, the 1975-76 estimated state aid without any income weighting was used as the controlled variable.

Since the 1975-76 expenditure data were not available, estimated data were used. The estimated expenditures were derived by adding district local revenues to state aid. The local revenues were estimated by multiplying the 1973 assessed valuation by the 1973 operating tax rate. The same local revenues were applied to state aid with various income weightings.

Statistical Design

Three descriptive statistics were employed to find the effects of the various income weightings on the distribution of state aid and expenditures: percentage, coefficient of variation, and simple regression coefficient. The percentage was used to determine the effects of state aid by community type, the coefficient of variation to test permissible variance of expenditures, and the simple regression coefficient to test fiscal neutrality. These statistics were applied to every type of school district.

In calculating percentages, total state aid and total TWADA were calculated separately by community type. State aid per TWADA of each community type was then computed by dividing total state aid by total TWADA. Estimated 1975-76 state aid per TWADA with income weighting was divided by the estimated 1975-76 state aid per TWADA without income weighting. The percentage difference from 100 reflects the effects of any particular income weighting.

The coefficient of variation is the standard deviation divided by the mean and multiplied by 100. In this study, the coefficient of variation of estimated expenditures per TWADA was computed to find the change of expenditure disparity within every type of school district due to the introduction of any of the four income weightings.

As to the measure of fiscal neutrality, two of the most often used operational definitions of fiscal neutrality defined by Hickrod and Michelson. Hickrod defined fiscal neutrality in terms of the Gini Index and the Lorenz Curve, e.g.,

> The cumulative percentage of students ranked by wealth is compared with the cumulative percentage of expenditures from state and local sources. It is also possible to make this comparison separately for expenditures locally raised, and then for expenditures raised both locally and from state sources. When absolute fiscal neutrality is reached the lowest 10 per cent of the students ranked by wealth will then receive 10 per cent of the state and local expenditures available for education, the lowest 20 percent will receive 20 per cent, etc. Such a function is then the straight line. . .[13]

At the earlier stage of this study, the Gini Index and the Lorenz Curve were used to analyze the effects of the income weightings. It was found that in some cases the Lorenz Curve crosses up and down the 45 degree line. This might lead to misinterpretation of the Gini Index. Therefore, the Gini Index and the Lorenz Curve were not used to test the fiscal neutrality in this study.

Another operational definition of fiscal neutrality was suggested by Michelson. According to Michelson's operational definition, in the regression equation with expenditures or revenues as the dependent variable and wealth as the independent variable, the closer to zero the regression coefficient is, the greater the degree of fiscal neutrality.[14] To follow Michelson's definition of fiscal neutrality, a simple linear regression equation was employed in this study. In this regression equation, both the dependent variable, district expenditures per pupil, and the independent variable, district assessed valuation per pupil were transformed into a logarithm.

Limitations

A small sample size was used in collecting the 1970 Census data. For personal income data the sample size was only 20 percent of the population.

Pohlmann found that the sampling errors in the fourth count of the 1970 Census data are worse for those school districts with enrollment fewer than 300.[15] Therefore, income data used in this study, especially those of small districts are vulnerable to sampling errors.

The income data retrieved from the 1970 Census reflect the 1969 personal income. It has been seven years since the census was taken. These out-of-dated income data may cause some errors in measuring the real taxpaying ability of districts.

In the analysis of the effects of the four income weightings by community type, only 930 school districts were included due to consolidations between 1964-65 and 1973-74. The findings of this part apply only to these 930 school districts.

Analyses in this study were based on 1975-76 state aid data, which do not reflect the effects of full funding. Hence, the findings of this study apply to 1975-76 only.

Analysis of Data

Effects by Community Type

It was expected that income weighting would help school districts outside the SMSA's, i.e., Independent Cities and Rural Areas. Table 1 shows that in comparison with assessed valuation without income weighting, assessed valuation with all except one of the four income weightings can cause an increase of state aid to elementary school districts outside the SMSA's. The only exception is Per TWADA Income Weighting, which reduces state aid per TWADA by 9 percent to elementary districts in Independent Cities. Among the four income weightings, Per Capita Income Weighting is favored the most by these districts in Independent Cities and Rural Areas, which experience a state aid increase of 10 percent and 9 percent, respectively.

With respect to elementary districts in the suburbs, Table 1 also reveals that only Aggregate Income Weighting has positive effects on the change of state aid to these districts. The Aggregate Income Weighting causes 4 percent

Table 1

State Aid per TWADA with an Income Weighting* As a Percentage of 1975-76 State Aid per TWADA By Community Type: Elementary Districts

Community Type	I	II	III	IV	V
Independent Cities	$ 513	1.1045	1.0857	1.0507	0.9120
High Growth Suburbs	$ 603	0.9334	0.8678	1.0430	0.9748
Low Growth Suburbs	$ 431	0.8227	0.7859	0.9763	0.6612
Rural Areas	$ 459	1.0868	1.0773	1.0593	1.0652

*I. 1975-76 State Aid Per TWADA Without Income Weighting.
II. With Per Capita Income Weighting.
III. With Median Family Income Weighting.
IV. With Aggregate Income Weighting.
V. With Per TWADA Income Weighting.

gain in state aid per pupil to elementary districts in High Growth Suburbs over state aid without any income weighting. State Aid per TWADA to these districts decreases, if the other three income weightings are used. The decreases range from 3 percent to 13 percent. As for elementary districts in Low Growth Suburbs, data show a similar result among the four income weightings. State Aid per TWADA to these districts decreases, regardless of which income weighting is applied to the state aid formula.

Table 2 reveals the effects of the four income-weighted assessed valuations on state aid to high school districts by community type. Among the four income weightings, only Per Capita Income Weighting and Median Family Income Weighting

increase state aid to high school districts in Independent Cities. Both income weightings give the eight high school districts a slight increase of state aid, 0.37 percent. On the other hand, Aggregate Income Weighting and Per TWADA Income Weighting reduce state aid to these districts by 0.31 percent and 29 percent, respectively.

Table 2

State Aid per TWADA with an Income Weighting* As a Percentage of 1975-76 State Aid per TWADA By Community Type: High School Districts

Community Type	I	II	III	IV	V
Independent Cities	$ 404	1.0037	1.0037	0.9969	0.7107
High Growth Suburbs	$ 394	0.9858	0 9688	0.9999	0.7893
Low Growth Suburbs	$ 244	0.9005	0.9095	1.0032	0.5040
Rural Areas	$ 359	1.0009	1.0003	1.0031	0.9190

*I. 1975-76 State Aid Per TWADA Without Income Weighting.
II. With Per Capita Income Weighting.
III. With Median Family Income Weighting.
IV. With Aggregate Income Weighting.
V. With Per TWADA Income Weighting.

Rural high school districts can benefit slightly from all except one of the four income weightings. The exception is Per TWADA Income weighting, which can cause an 8 percent decrease of state aid per TWADA to these districts. On the other hand, state aid per TWADA to those districts increases, if the other three income weightings are used. The increase ranges from 0.03 percent with Median Family Income Weighting to 0.31 percent with Aggregate Income Weighting.

Like elementary school districts, high school districts in the suburbs do not gain very much by the four income weightings. Among the four weightings,

only Aggregate Income Weighting results in a slight increase (0.32 percent) of state aid to high school districts in Low Growth Suburbs. For High Growth Suburbs, a decrease of state aid to high school districts will result from the use of any of the four income weightings.

Table 3 presents the effects of the four income-weighted assessed valuations on state aid to unit districts by community type. The effects of the four income weightings are very substantial. With one exception, state aid to

Table 3

State Aid per TWADA with an Income Weighting* As a Percentage of 1975-76 State Aid per TWADA By Community Type: Unit Districts

Community Type	I	II	III	IV	V
Central Cities	$ 554	1.0011	1.0052	1.0136	1.0193
Independent City	$ 484	1.1005	1.0856	1.0723	1.1458
High Growth Suburbs	$ 542	1.0131	0.9685	1.0880	1.1548
Low Growth Suburbs	$ 521	1.0635	1.0510	1.0612	1.1566
Rural Areas	$ 463	1.1219	1.1163	1.1090	1.1655

*I. 1975-76 State Aid Per TWADA Without Income Weighting.
II. With Per Capita Income Weighting.
III. With Median Family Income Weighting.
IV. With Aggregate Income Weighting.
V. With Per TWADA Income Weighting.

unit districts in every type of community as a whole increases due to the four income weightings. The exception is High Growth Suburbs, which lose about 3 percent of state aid if Median Family Income Weighting is used.

Among the four income weightings Per TWADA Income Weighting is the most favorable to unit districts. It allocates more state aid to each of the five types of communities than do the other three weightings. The increase of state

aid with the Per TWADA Income Weighting is 1.9 percent for Central City, 14.6 percent for Independent City, 15.5 percent for High Growth Suburbs, 15.7 percent for Low Growth Suburbs, and 16.6 percent for Rural Areas.

Surprisingly, if Per TWADA Income Weighting is used, the increase in state aid to the suburban unit districts is higher than that for Central City and Independent City. Although Rural Areas benefit more than the suburbs, the difference is not very substantial.

In summary, on the basis of state aid without income weighting, Per Capita Income Weighting can cause the largest percentage increase of state aid to elementary districts in Independent Cities and Rural Areas, and high school districts in Independent Cities. Elementary districts in High Growth Suburbs, and high school districts in Low Growth Suburbs and Rural Areas benefit the most from Aggregate Income Weighting, as far as the percentage increase of state aid is concerned. However, elementary districts in Low Growth Suburbs, and high school districts in High Growth Suburbs will suffer from all of the four income weightings. As to unit districts, Per TWADA Income Weighting is the most favored weighting by every community type.

Effects on Permissible Variance

Table 4 shows that for elementary districts the coefficients of variation with four income weightings are all lower than those without income weightings. The decreases of the coefficients are 2.34, 1.95, 1.04, and 0.90 for Per Capita Income Weighting, Median Family Income Weighting, Aggregate Income Weighting, and Per TWADA Income Weighting, respectively. A lower coefficient indicates less variation. It is evident that the Per Capita Income Weighting has the highest equalization effect on district expenditures if permissible variance is used as the criterion.

Table 4

Coefficient of Variation of Expenditures Per TWADA*
By School District Type

School District Type	I	II	III	IV	V
Elementary	27.84	25.50	25.89	26.80	26.94
High School	21.00	20.31	20.27	21.26	21.98
Unit	13.31	11.93	11.74	12.72	11.86

*I. Without Income Weighting.
II. With Per Capita Income Weighting.
III. With Median Family Income Weighting.
IV. With Aggregate Income Weighting.
V. With Per TWADA Income Weighting.

For high school districts, in comparison with the coefficients without income weighting the coefficients reflecting Per Capita Income Weighting and Median Family Income Weighting decreased by 0.69 and 0.73 percent, respectively, while the increase of the coefficient is 0.26 for Aggregate Income Weighting, and 0.98 for Per TWADA Income Weighting. In other words, Median Family Income Weighting is favored most by high school districts, as far as permissible variance is concerned.

For unit districts, the coefficient of variation of expenditure in comparison with the one without income weighting decreases for each of the four income weightings. The decreases of the coefficients are 1.38, 1.57, 0.59, and 1.45 for Per Capita Income Weighting, Median Family Income Weighting, Aggregate Income Weighting, and Per TWADA Income Weighting, respectively. Therefore, the Median Family Income Weighting has the highest equalizing effects on the distribution of expenditures among unit districts, if permissible variation is used as the equalization criterion.

In a word, if permissible variance is used as the criterion of equity, the most equitable of the four income weightings is Per Capita Income Weighting for elementary districts, and Median Family Income Weighting for high school and unit districts.

Effects on Fiscal Neutrality

Table 5 presents regression coefficients reflecting the effects of the four income weightings on fiscal neutrality by school district type.

Table 5

Regression Coefficients*

District Type	I	II	III	IV	V
Elementary	0.2033	0.1850	0.1896	0.2177	0.1729
High School	0.2675	0.2616	0.2617	0.2729	0.2347
Unit	0.0756	0.0738	0.0749	0.1099	0.0593

*Ln (Rev/pp) = a + b Ln (AV/pp) + e

I: Without Income Weighting.
II: With Per Capita Income Weighting.
III: With Median Family Income Weighting.
IV: With Aggregate Income Weighting.
V: With Per TWADA Income Weighting.

The regression coefficients show a decrease for all except one of the four income weightings in comparison with the regression coefficient reflecting no income weighting. The exception is Aggregate Income Weighting, which causes an increase of the regression coefficient for every type of school district. The decrease of the regression coefficient indicates a movement toward fiscal neutrality. A zero coefficient indicates perfect fiscal neutrality. Among the three income weightings with a decrease of the regression coefficient, Per TWADA

Income Weighting has the lowest regression coefficient for every type of school district. This can lead to the conclusion that Per TWADA Income Weighting is the best income weighting among the four studied income weightings, if fiscal neutrality is used as the criterion to measure equity.

Summary

Four income weightings, i.e., Per Capita Income Weighting, Median Family Income Weighting, Aggregate Income Weighting, and Per TWADA Income Weighting were applied separately to assessed valuation in computing Illinois general state aid to education. The effects of the four income weightings were investigated according to the following three dimensions: (1) community type, (2) permissible variance, and (3) fiscal neutrality. The following are the major findings of the study:

1. In terms of the percentage increase of state aid per TWADA, Per Capita Income Weighting was found to be the most favorable weighting among the four income weightings to elementary districts in Independent Cities and Rural Areas, and high school districts in Independent Cities.
2. Aggregate Income Weighting most favored the elementary districts in High Growth Suburbs, and high school districts in Low Growth Suburbs and Rural Areas, as far as the percentage increase of state aid per TWADA is concerned.
3. Per TWADA Income Weighting was the most favored weighting for unit (K-12) school districts in every type of community on the basis of the percentage increase of state aid per TWADA.
4. If permissible variance is used as the criterion of equity, the best of the four income weightings is Per Capita Income Weightings for

elementary districts, and Median Family Income Weighting for high school and K-12 districts.

5. Per TWADA Income Weighting is the best income weighting among the four income weightings for every type of school district, if fiscal neutrality is used as the criterion to measure equity.

Notes and References

1. See for example: Benson, Charles S., Paul M. Goldfinger, E. Gareth Hoachlander, and Jessica S. Pers. Planning for Educational Reform: Financial and Social Alternatives. New York: Dodd, Mead & Company, 1974, pp. 73-74; Callahan, John J., William H. Wilken, and Tracy M. Sillerman. "Urban Schools and School Finance Reform: Promise and Reality." Washington, D. C.: The National Urban Coalition, 1973, pp. 12-13 (Mimeograph); Hou, Jaw-nan. "Effects of Selected Variables on the Distribution of Illinois State Aid to Education." Ph. D. dissertation, Illinois State University, 1975, pp. 128-129.

2. See for example: Benson, Charles S., and others. Planning for Educational Reform. Op. Cit. pp. 77-88; Hickrod, G. Alan, and Cesar M. Sabulao. Increasing Social and Economic Inequalities Among Suburban Schools. Danville, Illinois: Interstate Printers and Publishers, 1965, p. 39; H.B. 1125, 79th General Assembly, State of Illinois, 1975.

3. Ahlf, Duane R. Measurement of Fiscal Capacity of School Districts in Wisconsin. Madison, Wis.: The University of Wisconsin, 1964.

4. James, H. Thomas and Joseph M. Cronin. "New Developments and Trends in School Finance: Projections and Observations," in The Theory and Practice of School Finance. ed. by Warren E. Ganerke and Jack R. Childress. Chicago, Ill.: Rand McNally and Company, 1969.

5. Kelly, James A. State Financial Assistance for Public School Housing in Rhode Island. Providence, R. I.: Rhode Island Special Commission to Study the Entire Field of Education, November, 1967.

6. Crosby, John C. "Equity in Taxation." Ph.D. Dissertation, Teacher College, Columbia University, 1972.

7. Hickrod, G. Alan, Ben C. Hubbard, and Thomas Weichi Yang, "The 1973 Reform of the Illinois General Purpose Educational Grant-in-Aid: A Description and an Evaluation." Selected Papers in School Finance. Washington, D. C.: U. S. Office of Education, 1974.

8. Hou, J. Dan. Effects of Selected Variables. Op. Cit., pp. 132-133.

9. Hou, J. Dan. Effects of Selected Variables. Op. Cit., p. 97.

10. Peterson, LeRoy J., Richard J. Rossmiller, Howard E. Wakefield, and Stewart D. North. Economic Impact of State Support Models on Education Finance. Madison, Wis.: The University of Wisconsin, 1963; Rossmiller, Richard A., James A. Hale, and Lloyd E. Frohreich. Fiscal Capacity and Educational Finance. Madison, Wis.: Department of Educational Administration, The University of Wisconsin, 1970.

11. U. S. Bureau of the Census. 1970 Census of Population: General Social and Economic Characteristics, Final Report, PC(1)-C15, Illinois. Washington, D.C.: U. S. Government Printing Office, 1972.

12. Illinois Office of Education. The School Code of Illinois. St. Paul, Minn.: West Publishing Co., 1974.

13. Hickrod, G. Alan. "Alternative Fiscal Solutions to Equity Problems in Public School Finance," in School Finance in Transition. Gainesville, Fla.: National Conference on School Finance, University of Florida, Institute for Educational Finance, 1973.

14. Michelson, Stephen. "What is a 'Just' System for Financing Schools?" Law and Contemporary Problems. Winter-Spring, 1974.

15. Pohlmann, Vernon C. "Suggested Uses and Some Limitations of School District Census Data," in 1970 Census: Illinois School District Profiles. Springfield, Ill.: Illinois Office of Education, 1974.

VARIOUS INCOME-WEIGHTED OPERATING TAX RATES AND ILLINOIS STATE AID TO EDUCATION

Introduction

In Illinois, public school districts can choose either the resource equalizer formula or the Strayer-Haig formula to compute their state aid claims. In 1975-76, 81 percent of Illinois school districts with 94 percent of pupils picked the resource equalizer formula. According to the resource equalizer formula, districts with the same operating tax rate are guaranteed the same level of expenditures in the long run. As for districts with different operating tax rates, those with higher operating tax rates are guaranteed higher levels of expenditures. The difference between the guaranteed expenditures and local revenues is covered by state aid. The local revenues come from taxation on assessed valuation of real property within the local school district. In other words, the guaranteed expenditure level is the function of operating tax rates rather than assessed valuation under the resource equalizer formula.

The resource equalizer formula was designed to meet the requirement of fiscal neutrality, a principle established in Serrano v. Priest. Districts with lower assessed valuation per pupil were the major concern of the Serrano case. Data in Table 1 show that these districts tend to be the ones with higher operating tax rates. Hence, these districts are likely to benefit the most from the resource equalizer formula.

It has been asked very often whether (income) poor families live in school districts with lower assessed valuation per pupil. In 1974, Benson stated that "poor people live in all types of districts, as characterized by assessed valuation per student."[1] Testing this conclusion, Hou conducted

Table 1

The Correlation Coefficients between Various Variables and 1973 Operating Tax Rates by District Type

	1973 EAV* per TWADA**	Median Family Income	Per Capita Income
Elementary	-0.27	0.65	0.61
High School	-0.28	0.55	0.55
Unit	-0.33	0.29	0.23

*EAV stands for equalized assessed valuation.
**TWADA is an acronym for Title I weighted average daily attendance.

a study in 1975 to investigate the relationship between district assessed valuation per pupil and median family income for Illinois. He found a curvilinear relationship existing between these two variables. For each type of school district with below-the-median assessed valuation per pupil, a positive relationship was found between district median family income and assessed valuation per pupil. Among school districts with above-the-median assessed valuation per pupil, elementary and unit districts show no noticeable relationship between median family income and assessed valuation per pupil, while the relationship for high school districts was found to be negative.[2] In other words, there are school districts in Illinois which are low in median family income, but high in assessed valuation per pupil. These districts tend to have low operating tax rates. Under the resource equalizer formula, these districts are not guaranteed so high an expenditure level as are the school districts with higher operating tax rates.

Table 1 also reveals that lower operating tax rates tend to be found in school districts with lower median family income or per capita income, and vice versa, especially in elementary and high school districts. Under the resource equalizer formula, a lower expenditure level is guaranteed to districts with lower operating tax rates, and a higher expenditure level to districts with higher operating tax rates. Hence, a lower expenditure level tends to be associated with a lower income level, and a higher expenditure level with a higher income level. In other words, the inclusion of the operating tax rate in the resource equalizer formula tends to help (income) rich school districts more than (income) poor districts in terms of expenditure level.

To provide equal access to available resources for school districts with less ability-to-pay, i.e. lower income level, two methods have been proposed or used to include an income factor in the state aid formula. The first method is to weight assessed valuation by income.[3] As such, districts with higher assessed valuation per pupil and lower income level would increase access to state funds. The second method is to weight tax rates by income.[4] The weighting would give tax rate credits to school districts with lower income level. As a result, these (income) poor districts would have a greater opportunity to participate fully in the state aid system. The second method may exert more influence than the first method on school districts using the resource equalizer formula, in which the expenditure level is the function of operating tax rates. Therefore, the second method should be considered more carefully in planning the reform of a state aid system.

It was the purpose of this study to investigate the effects of various income-weighted operating tax rates on the distribution of Illinois state aid to education.

Objectives of the Study

The objectives of the study were to investigate the following questions:

1. Which types of communities will be affected the most by income-weighted operating tax rates: central cities, suburbs, independent cities or rural areas?
2. What are the effects of income-weighted operating tax rates on the reduction of district expenditure variation?
3. What are the effects of income-weighted operating tax rates on fiscal neutrality?

Sources of Data

The fiscal data used in this study were retrieved from the data files of the Illinois Office of Education. These fiscal data include those for calculating estimated 1975-76 state aid. Median family income and per capita income data were obtained from the 1970 Census: Illinois School District Profiles, which was also published by the Illinois Office of Education. Information in the Profiles was retrieved from the fourth count tape of the 1970 Census data developed by the U.S. Bureau of the Census. Census data used to classify school districts in the geographical typology were retrieved from the fifth count tape of the 1970 Census data.

Variables Used and Definitions of Terms

Community Type

In this study a geographical typology was used to classify communities served by school districts. According to the geographical typology, Illinois school districts were put into the following four categories: central city, suburb, independent city, and rural area. A central city school district is one which serves the largest city in the standard

metropolitan statistical area (SMSA) as defined by the U.S. Bureau of the Census in 1970.[5] School districts with less than 50 percent of population living in urbanized areas were classified as rural area districts, regardless of whether they are in SMSA's or non-SMSA's. On the other hand, school districts with over 50 percent of their population residing in the urbanized areas were considered as "urban" school districts. The SMSA urban school districts except those of central cities were further categorized as suburbs. If the urban school districts are not in the SMSA's, they were considered as independent city districts.

Estimated Expenditures

For this study, actual operating expenditures are not available. Hence, operating expenditures were estimated by adding estimated 1975-76 state aid to local operating revenues. The local operating revenues are the product of district assessed valuation multiplied by its operating tax rate.

Income-Weighted Operating Tax Rates

In this study three income-weighted operating tax rates were included separately in the simulations of 1975-76 estimated state aid formulas. In the simulations, all of the variables except the operating tax rate were held constant. The district operating tax rate was replaced by an income-weighted operating tax rate in each simulation. The following are the three income-weighted operating tax rates:

OTR1. This income-weighted operating tax rate was developed on the basis of the rank order of the district median family income. More operating tax rate credits were given to the group of districts with lower median family income. However, the credits were not given to school

districts with a median family income higher than the state median family income ($11,096), or districts with operating tax rates lower than the maximum operating tax rates of non-referendum (1.27% for elementary and high school districts, and 2.075% for unit districts.) In essence, this is a grouped weighting of median family income.

OTR2. The district operating tax rate was multiplied by the ratio between the state median family income ($11,096) and the district medain family income. For school districts where either the median family income was above $11,096 or the operating tax rate was below the maximum operating tax rate of non-referendum, no credit was applied to the operating tax rate. In other words, OTR2 is an individual weighting of median family income.

OTR3. In this weighting, the district operating tax rate was multiplied by the ratio between the state per capita income ($3,498) and the district per capita income. School districts with either the per capita income above $3,498 or the operating tax rate below the maximum operating tax rate of non-referendum were given no weighting.

For those school districts either with the income level above the state average, or with the operating tax rate below the maximum operating tax rate of non-referendum, the operating tax rates remain unweighted for OTR1, OTR2, and OTR3. In other words, operating tax rates for each of these districts were the same for all of the simulations.

Operating Tax Rates

Operating tax rates as defined in The School Code of Illinois consists of all district taxes extended for all purposes except bond and interest, summer school, rent, transportation (will be optionally included in 1976-77), special education building, capital improvement, and vocational education building.[6]

Study Population

The population of this study consists of all public school districts in Illinois, except high school districts. The reason for excluding high school districts is that these school districts in theory can reach the maximum of the state guaranteed expenditure levels without passing referendum. In other words, high school districts can reach that maximum expenditure level with an operating tax rate of 1.05%, which is below the 1.27% of the maximum operating tax rate of non-referendum. It was found that operating tax rates of all high school districts fall below the 1.27%. In this study, any school district with an operating tax rate below the maximum operating tax rate of non-referendum was given no weighting to their operating tax rates.

Statistics

In this study, three statistics were used: percentage, coefficient of variation, and coefficient of regression. Percentage was used to investigate the change of operating tax rates and state aid by district type and community type. The coefficient of variation, which is the product of 100 multiplied by the ratio of the standard deviation to the mean, was used to measure the variation of expenditures per TWADA. A lower coefficient indicates a reduction in expenditure differences between districts. The coefficient of regression was used to measure fiscal neutrality. In the regression equation, the logarithm base 10 of the estimated expenditures per TWADA is the dependent variable, and the logarithm base 10 of assessed valuation per TWADA is the independent variable. The coefficient of regression can be either positive or negative. If the sign is positive, the closer the coefficient is to zero, the closer it shows fiscal neutrality. If the sign is negative, the farther the coefficient is from zero, the greater it shows the compensatory effects.

Limitations

Income data used in this study were retrieved from the fourth and the fifth count tapes of the 1970 Census data. The data reflect consolidations of Illinois school districts until July of 1975. For school districts consolidated afterwards, no income data are available to weight their operating tax rates. Hence, for these districts estimated state aid without income weighting was used for each weighting instead.

A small sample size was used in collecting the 1970 Census data. For personal income data, the sample size was only 20 percent of the population. Pohlmann found that the sampling errors in the fourth count of the 1970 Census data are worse for those school districts with enrollment fewer than 300.[7] Therefore, income data used in this study, especially those of small districts are vulnerable to sampling errors.

The income data retrieved from the 1970 Census reflect the 1969 personal income. It has been seven years since the Census was taken. These out-of-dated income data may cause some errors in measuring the real taxpaying ability of districts.

Findings of Data Analysis

Effects of Income Weighting on Operating Tax Rates

Table 2 presents percentages of the best six months average daily attendance (ADA) and percentages of school districts that would be influenced by the three income weightings. If the operating tax rate is weighted by median family income, i.e., OTR1 or OTR2, 33.77 percent of elementary school districts with 17.68 percent of ADA, and 72.07 percent of unit districts with 41.41 percent of ADA could be favorably affected. Table 2 also shows that the per capita income weighting could cause an increase of the operating tax rate for purposes of estimating state aid

claims. The increase would be reflected in 40.22 percent of elementary districts (or 181 districts) with 28.14 percent of ADA, and 74.54 percent of unit districts (or 331 districts) with 41.46 percent of ADA. From these data, it can be concluded that the per capita income weighting among the three studied income weightings could exert the most effects on the operating tax rates of elementary and unit districts on the basis of the number of affected ADA and school districts.

Table 2

Percentage of ADA and School Districts Benefiting from Income Weighting

	OTR1*	OTR2**	OTR3***
Elementary			
ADA: 497,145	17.68	17.68	28.14
Districts: 450	33.77	33.77	40.22
Unit			
ADA: 1,276,749	41.41	41.41	41.46
Districts: 444	72.07	72.07	74.54

*OTR1: Operating tax rate with the grouped weighting of median family income.
**OTR2: Operating tax rate with the individual weighting of median family income.
***OTR3: Operating tax rate with the per capita income weighting.

Table 3 displays the percentages of ADA and school districts with the maximum operating tax rate for full funding, i.e. 1.95% for elementary or 3.00% for unit districts as of 1975-76. Only 20.44 percent of elementary districts (or 92 districts) with 46.01 percent of ADA, and 4.05 percent of unit districts (or 18 districts) with 42.01 percent of ADA reached the full-funding maximum operating tax rates without any income weighting in 1975-76. If the income weightings are applied to the operating tax rates,

the percentages of districts with the full-funding maximum operating tax rates will all increase. Among the three income weightings, the per capita income weighting can result in the highest percentage of districts with the maximum full-funding operating tax rates: 35.33 percent of elementary districts with 52.97 percent of ADA, and 41.21 percent of unit districts with 56.94 percent of ADA. These represented an increase of 14.89 percent of elementary districts (or 67 districts) and 37.16 percent of unit districts (or 165 districts).

Table 3

Percentage of ADA and School Districts with the Maximum Operating Tax Rate for Full Funding

	OTR*	OTR1**	OTR2**	OTR3**
Elementary				
ADA: 497,145	46.01	50.97	50.21	52.97
Districts: 450	20.44	33.33	32.44	35.33
Unit				
ADA: 1,276,749	42.01	51.71	54.67	56.94
Districts: 444	4.05	31.53	39.86	41.21

*OTR: Operating tax rate without income weighting.
**OTR1, OTR2 and OTR3 are the same as those in Table 2.

Effects of Income Weighting on State Aid

In the 1973 reform of the Illinois state aid system, limitations were imposed on school districts to prevent full funding of the state aid difference between the old and new systems in the first four years. In this study, "estimated claim" indicated the amount of state aid a school district can claim with all the limitations, while "fully-funded state aid" refers to the amount of state aid a district may be fully entitled in the long run without any such limitations.

Tables 4 and 5 present separately the total state aid for estimated claim and full funding by district type. The total state aid for estimated claim in 1975-76 was $1.203 billion without income weighting, $1.237 billion with the grouped weighting of median family income, and $1.234 billion with the individual weighting of median family income, and $1.238 billion with the per capita income weighting. In the long run, the state aid total for full finding is $1.452 billion without income weighting, $1.512 billion with the grouped weighting of median family income, $1.508 billion with the individual weighting of median family income, and $1.515 billion for the per capita income weighting.

Table 4

State Total Estimated Claim: 1975-76

	OTR	OTR1	OTR2	OTR3
Elementary	$ 260,483,232	$ 266,508,976	$ 265,204,224	$ 267,150,304
High School	112,055,936	112,055,936	112,055,936	112,055,936
Unit	830,675,456	858,903,040	856,649,472	858,811,904
State Total	$1,203,214,624	$1,237,467,952	$1,233,909,632	$1,238,018,144

Table 5

State Total Fully Funded State Aid

	OTR	OTR1	OTR2	OTR3
Elementary	$ 289,173,760	$ 300,530,176	$ 298,401,024	$ 301,302,528
High School	223,918,912	223,918,912	223,918,912	223,918,912
Unit	939,083,008	987,549,952	985,853,696	989,596,928
State Total	$1,452,175,680	$1,511,999,040	$1,508,173,632	$1,514,818,368

Tables 6 and 7 show the effects of the various income weightings on the estimated claim and fully funded state aid per TWADA by district type and by community type. For elementary school districts, the per capita income weighting (OTR3) could cause the largest percentage increase of state aid: 2.56 percent for 1975-76 estimated claims per TWADA, and 4.19 percent at full funding. For unit districts, the largest percentage increase of 1975-76 estimated state aid claim per TWADA could be caused by the grouped weighting of median family income (OTR1). The percentage increase would be 3.39 percent over the one for non-weighting. However, if it would be fully funded in the long run, the per capital income weighting (OTR3) would give unit districts the largest percentage increase in state aid, i.e., 5.38 percent.

Table 6

Estimated State Aid Claim per TWADA with an Income Weighting as a Percentage of 1975-76 Estimated Claim per TWADA With No Income Weighting

	OTR	OTR1	OTR2	OTR3
Elementary	$496.82	102.31%	101.81%	102.56%
Unit	$525.43	103.39%	103.12%	103.38%
Elementary Districts				
Suburbs	$501.46	101.07%	100.73%	101.27%
Independent Cities	$498.52	111.11%	109.37%	111.56%
Rural Areas	$468,47	105.69%	104.79%	106.15%
Unit Districts				
Central Cities	$553.69	100.74%	100.44%	100.11%
Suburbs	$558.95	102.33%	101.90%	103.26%
Independent Cities	$501.97	110.13%	109.91%	110.54%
Rural Areas	$431.65	108.79%	108.81%	109.52%

Table 7

Estimated Fully Funded State Aid per TWADA with an Income Weighting as a Percentage of That With No Income Weighting

	OTR	OTR1	OTR2	OTR3
Elementary	$551.54	103.92%	103.19%	104.19%
Unit	$594.00	105.16%	104.98%	105.38%
Elementary Districts				
Suburbs	$558.22	101.49%	101.06%	101.93%
Independent Cities	$540.52	119.81%	116.57%	117.89%
Rural Areas	$518.38	111.82%	110.36%	121.19%
Unit Districts				
Central Cities	$648.43	101.29%	100.95%	100.60%
Suburbs	$608.89	103.05%	102.64%	104.40%
Independent Cities	$539.85	115.11%	115.21%	116.06%
Rural Areas	$466.20	114.81%	115.33%	116.54%

Tables 6 and 7 also reveal the effects of three income weightings on the distribution of state aid among the different types of communities. With regard to elementary districts, if the per capita income weighting were used in the formula, the percentage increase of 1975-76 estimated claim would be the highest: 1.27 percent for suburbs, 11.56 percent for independent cities and 6.15 percent for rural areas. In the long run, the fully funded state aid to these districts under the per capita income weighting would increase 1.93 percent for suburbs, 17.89 percent or independent cities (which is a little lower than that under the grouped weighting of median family income), and 21.19 percent for rural areas.

For unit districts, the findings for estimated claim and full funding are consistent. For central cities, the greatest percentage increase in state aid for the estimated claim and at full funding can be caused by the grouped weighting of median family income weighting: 0.74 percent and 1.29 percent, respectively. As for the other types of

communities, the per capita income weighting would cause the largest percentage increase of estimated claim: 3.26 percent for suburbs, 10.54 percent for independent cities, and 9.52 percent for rural areas. If state aid is fully funded, these communities will also benefit the most from the per capita income weighting: 4.4 percent for suburbs, 16.06 percent for independent cities and 16.54 percent for rural areas.

Tables 6 and 7 also reveal that the percentage increase in state aid to elementary and unit districts in independent cities and rural areas would be much higher than that for these districts in central cities and suburbs. This finding reflects the fact that districts in independent cities and rural areas have a much lower median family income or per capita income than do districts in central cities and suburbs, as shown in Table 8. These lower income levels, together with

Table 8

Averages of District Ability and Effort Measures
by Community Type*

73 Operating Tax Rates:				
	1*	2*	3*	4*
Elementary		1.869	1.429	1.394
High School		1.720	1.332	1.437
Unit	2.456	2.600	2.323	2.275
Median Family Income:				
	1	2	3	4
Elementary		13,896	9,152	9,320
High School		13,343	9,105	8,883
Unit	10,186	11,228	8,971	8,606
Per Capita Income:				
	1	2	3	4
Elementary		4,141	2,849	2,810
High School		4,038	2,814	2,730
Unit	3,295	3,366	2,808	2,700

*Community types:
1 - Central City, 2 - Suburb
3 - Independent City, 4 - Rural Area

lower operating tax rates result in a very high percentage increase in state aid to districts in these communities.

Effects on Reduction of Expenditure Variation

Table 9 presents coefficients of expenditure variation for different income weightings. The coefficients of variation for all three weightings are lower than those for non-weighting. This indicates that the income weightings would have the effect of reducing expenditure variation. Among the three weightings, per capita income weighting produces the lowest coefficients with one exception. The exception is the one for expenditures with full funding of elementary districts. In this case, the grouped weighting of median family income results in a slightly lower coefficient than the per capita income weighting. However, the difference is not significant. Therefore, it can be concluded that the per capita income weighting would be the best weighting in reducing the variation of expenditures.

Table 9

Coefficients of Variation*: Estimated 1975-76 Expenditures per TWADA

	OTR	OTR1	OTR2	OTR3
	With Estimated Claim			
Elementary	30.95	29.58	29.77	29.53
Unit	13.31	12.47	12.47	12.44
	With Full Funding			
Elementary	29.79	27.59	27.91	27.60
Unit	13.66	13.41	13.42	13.39

*Coefficient of variation = (standard deviation/mean)*100

Effects on Fiscal Neutrality

Table 10 displays the coefficients of regression for all of the three income weightings. The coefficients of regression for the three income weightings are lower than those for non-weighting, if the estimated claim is included in computing estimated expenditures. The coefficients for both elementary and unit districts are the lowest, if the per capita income weighting is used. This indicates that the per capita income weighting is the best weighting among the three studied income weightings to move toward fiscal neutrality. If in the long run state aid is fully funded, the data in Table 10 also show that the per capita income weighting is still the best weighting to achieve fiscal neutrality for elementary districts. As for unit districts, it was found that the coefficients approach zero, (which indicates complete fiscal neutrality), and then become negative. These negative coefficients reflect compensatory effects. The higher the negative coefficient, the higher the compensatory effects. The per capita income weighting has the highest compensatory effects. Therefore, the per capita income weighting is the best weighting to move toward fiscal neutrality for both elementary and unit districts, and to have compensatory effects on unit districts with full funding.

Table 10

Coefficients of Regression*

	OTR	OTR1	OTR2	OTR3
	With Estimated Claim			
Elementary	0.1105	0.0852	0.0876	0.0832
Unit	0.0756	0.0383	0.0384	0.0367
	With Full Funding			
Elementary	0.0700	0.0147	0.0190	0.0137
Unit	0.0159	-0.0581	-0.0591	-0.0636

*$\log_{10}$ expenditures/TWADA = a + b $\log_{10}$ (EAV/TWADA)

Summary of the Findings

1. Among the three income-weightings, the per capita income weighting would be the best weighting in terms of the numbers of school districts and ADA, that would experience an increase in operating tax rate. The per capita income weighting would cause an increase in operating tax rate for purposes of computing state aid in 40.22 percent of elementary districts (or 181 districts) with 28.14 percent of ADA, and 75.54 percent of unit districts (or 331 districts) with 41.46 percent of ADA.
2. On the basis of the percentage of school districts reaching the maximum full-funding tax rates, which was 1.95% for elementary districts and 3.00% for unit districts as of 1975-76 the per capita income weighting would be also the best among the three income weightings. Under the per capita income weighting, the percentage of districts with the maximum full-funding operating tax rates would be: 35.33 percent of elementary districts with 52.97 percent of ADA, and 41.21 percent of unit districts with 56.94 percent of ADA. The change in the number of school districts with the maximum full-funding operating tax rates from non-weighting to the per capita income weighting would be: 92 versus 159 of elementary districts, and 18 versus 183 of unit districts.
3. Among the three income weightings, the per capita income weighting would be the most favored weighting for elementary and unit districts on the basis of the percentage increase in both per TWADA estimated claim and fully funded state aid.
4. Among elementary districts, the per capita income weighting would be the most favorable to districts of all three types of

communities: suburbs, independent cities and rural areas, if the percentage change per TWADA estimated claim is used as the criterion. If state aid were fully funded, the per capita income weighting would also be the most favorable to elementary districts in both suburbs and rural areas. However, the grouped weighting of median family income would be the most favorable weighting to elementary districts in independent cities.

5. Among unit districts, districts in communities of all types except central cities can benefit the most from the per capita income weighting in terms of estimated claim per TWADA. The grouped weighting of median family income would be of most benefit to unit districts in central cities, although the percentage increase would not be very substantial. These findings are consistent with those based on fully funded state aid per TWADA.

6. The data reveal a substantial percentage increase of per TWADA estimated claim and fully funded state aid for both elementary and unit districts in independent cities and rural areas in comparison with the increase for districts in suburbs or central cities, regardless of which of the three income weightings is used.

7. The coefficients of variation reveal that all three income weightings can reduce the variation of estimated expenditures per TWADA for elementary and unit districts, regardless of whether estimated claim or fully funded state aid is used. However, the per capita income weighting appears to be slightly better than the other two income weightings in reducing the variation of expenditures.

8. The coefficients of regression show that all three income weightings can move both elementary and unit districts closer to fiscal neutrality on the basis of either estimated claim or fully funded state aid. Among the three income weightings, the per capita income weighting appears to be the best weighting to bring about fiscal neutrality. Furthermore, it is important to note that all the three income weightings have compensatory effects on unit districts, if state aid is fully funded in the long run. However, the per capita income has the highest compensatory effects.

Conclusions

On the basis of the analyses of the data, it can be concluded that the per capita income weighting would be a better weighting to be applied to the operating tax rate than either the grouped weighting of median family income or individual weighting of median family income. If the per capita income weighting were to be adopted, the increase of the state total estimated claim of state aid for 1975-76 would be $35 million from $1.203 billion, which was the 1975-76 state total without income weighting. However, if state aid would be fully funded in the long run and the per capita income weighting would be used, the increase from $1.452 billion, which is for non-weighting, would be $63 million.

There are certain advantages to weight operating tax rates by income as suggested in the study. They are described as follows:

1. No penalties would be imposed on those school districts with above-the-state-average income. It is $3,498 of per capita income and $11,096 of median family income. The practice would be politically popular.

2. It would help the school districts in independent cities and rural areas substantially, together with hundreds of school districts in other areas. The inclusion of income weightings would increase the burdens to the state around $60 million for full funding of the formula in the long run.
3. It would provide more opportunities for income poor districts to fully participate in the state aid system. Data show that increase of the number of school districts with the maximum operating tax rates for full funding would be 67 elementary districts and 165 unit districts, if the per capita income weighting would be used in the Illinois state aid system.

References

1. Benson, Charles S., Paul M. Goldfinger, E. Ganeth Hoachlander, and Jessica S. Pers. Planning for Educational Reform: Financial and Social Alternatives. New York: Dodd, Mead & Company, 1974, p. 74.

2. Hou, Jaw-nan. "Effects of Selected Variables on the Distribution of Illinois State Aid to Education." Ph.D. disseration, Illinois State University, 1975, pp. 128-129.

3. See for example: Kelly, James A. State Financial Assistance for Public School Housing in Rhode Island. Providence, R.I.: Rhode Island Special Commission to Study the Entire Field of Education, November, 1976; Crosby, John C. "Equity in Taxation." Ph.D. disseration, Teacher College, Columbia University, 1972; and Illinois Office of Education. Effects of Various Income Weightings on the Distribution of Illinois State Aid to Education. Springfield, Ill.: The Office, 1976.

4. See for example: H. B. 1125, 79th General Assembly, State of Illinois (1975). In this Bill, 23 Illinois Representatives proposed to weight the operating tax rates by per capita income; and Hichrod, G. Alan and Ben C. Hubbard. The Concept of Fiscal Effort in the Illinois General Purpose Education Grant-In-Aid: Some Legal and Measurement Problems. Center for the Study of Educational Finance, Department of Educational Administration, Illinois State University, Normal, Ill., 1976.

5. U.S. Bureau of the Census. 1970 Census of Population: General Social and Economic Characteristics, Final Report, PC(1) - C15, Illinois. Washington, D.C.: Government Printing Office, 1972, App. 1-2.

6. Illinois Office of Education. The School Code of Illinois. St. Paul, Minn.: West Publishing Co., 1974, p. 141.

7. Pohlmann, Vernon C. "Suggested Uses and Some Limitations of School District Profiles." Illinois Office of Education. Springfield, Ill.: The Office, 1974, p. vii.